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Connecticut Inland Fisheries

Coldwater Lakes Management



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Bureau of Natural Resources
Inland Fisheries Division



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Cover photos: (Left) Female Kokanee Salmon awaiting spawning at the Burlington State Hatchery, (Right) a deceased Rainbow Smelt specimen collected from a private lake, (Bottom) a spectacular looking male Seeforellen-strain Brown Trout prior to being stocked into Highland Lake.

Summary

Fertilized Rainbow Smelt eggs were collected via artificial spawning mats from a drinking water supply reservoir (closed to angling) and transported to West Hill Pond in hopes of restoring an extirpated population, enhancing the forage base, and increasing angling opportunities in the future. Oxygen/Temperature profiles were conducted at coldwater lakes during the summer of 2014. Kokanee Salmon management followed standard procedures in 2014. Three lakes were stocked during the spring with fry, and broodstock Kokanee were collected from West Hill Pond in the fall for spawning at Burlington State Fish Hatchery. A population estimate conducted in the fall of 2014, showed East Twin Lake to have ~4,800 reproductively mature Kokanee Salmon. No holdover (≥ 16 inch) Brown Trout were detected during fall electrofishing at Crystal Lake, but sampling efforts did show a high abundance (103 fish/hr) of landlocked Alewives.

Background

Beginning in 1988, the Connecticut Inland Fisheries Division (IFD) enacted special regulations (slot length limits, minimum length limits, and season closures) on three Trout Management Lakes (TMLs; Crystal, Highland, and East Twin lakes) in an attempt to provide increased fishing opportunities for large holdover Brown Trout (see 2012 Coldwater Lakes Progress Report for regulation details). At that time, all of these lakes had suitable coldwater habitat and viable populations of landlocked alewives, and through the years, assessment focused on the ability of special regulations to improve fishing for holdover Brown Trout (Orciari et al. 2011). Other TMLs (Amos Lake, Candlewood Lake, Quonnipaug Lake, Rogers Lake, and Squantz Pond) occasionally produced some large, holdover trout but had less restrictive trout regulations (5 trout daily creel limit; no size restriction) along with an extended March fishing season (one trout daily creel limit; 16 inch minimum length). These lakes were not studied as intensively as those that consistently produced holdover trout.

Success of the special regulations on Crystal, Highland, and East Twin lakes has been variable over a prolonged period (approximately 15 years), but recently, Crystal and East Twin have shown declining trends. In fact, because of poor holdover production, Trophy Trout Lakes were renamed Trout Management Lakes in 2011 to reflect the reduction in the frequency of catching trophy-size holdover trout. Variability in over-summer coldwater habitat, fluctuating abundance or the complete disappearance of alewife, high hooking mortality from intense catch-and-release rates, summer fishing pressure, occasional summer trout kills, and illegal harvest of trout may have negated any benefit conferred by special regulations (Orciari et al. 2011). Consequently, special regulations may no longer be appropriate in certain TMLs where habitat and forage conditions have changed, and holdover Brown Trout have declined

dramatically. In 2015, special trout regulations will be discontinued at East Twin Lake. This decision was based on results from both biological sampling and angler surveys that indicate reduced production and catches of large holdover trout (due to the complete collapse of the lake's alewife forage base) despite restrictive regulations and carefully timed stockings.

Data indicate that conditions in some of Connecticut's coldwater lakes have become less favorable for producing holdover Brown Trout (i.e., poor over summer coldwater habitat and loss/fluctuations of forage base), and thus special regulations may no longer be applicable. Because of this, in 2013, CT's coldwater lakes were reevaluated and categorized for their potential to support coldwater fisheries. Lakes were assessed, evaluated, and categorized by available coldwater habitat (including thermal refuges) and forage availability. Insight into these parameters will give IFD staff the ability to develop several different management strategies and determine the best options for each lake.

Creating a suite of specific management practices suited to the habitat, forage, and potential for coldwater fisheries in each waterbody are future goals of the IFD. In lakes capable of growing trout, production of large, holdover Brown Trout should remain a viable option. At lakes where holdover production is no longer possible, other options should be considered for improving catch rates of large trout. These options may include alternative stocking techniques (use of larger fish, different strains, or sterile fish), and the potential for stocking forage fish (i.e. Rainbow Smelt). In addition, other coldwater fisheries (i.e. Kokanee Salmon and possibly smelt) should be explored and improved where possible. This may allow for the opportunity to manage some lakes for coldwater fisheries other than trout (i.e. smelt, landlocked kokanee, etc.).

In Connecticut, Kokanee Salmon were first observed in East Twin Lake (Salisbury) during the 1930s. The salmon successfully reproduced and a popular recreational fishery developed in the 1940s. However, natural reproduction could not support the increased fishing pressure, and the Kokanee population collapsed by the late 1940s. Because of the Kokanee's popularity with anglers, the Connecticut Board of Fisheries and Game (predecessor to the CT Department of Energy and Environmental Protection, DEEP) reintroduced them into East Twin Lake in the late 1950s. Since that time broodstock fish have been collected each fall, spawned in the Burlington State Fish Hatchery, and the fry released the following spring. Presently, Kokanee Salmon are actively managed in three coldwater lakes (East Twin Lake, West Hill Pond, and Lake Wononskopomuc). Continued management and assessment of Kokanee is warranted due to their ability to provide unique fisheries that are highly attractive to CT anglers; to our knowledge, CT is the only state east of the Rocky Mountains that actively stocks and manages Kokanee Salmon.

The purpose of Job 7 is to evaluate and manage coldwater fisheries in Connecticut's lakes. This report summarizes work conducted during 2014 at TMLs, and other important lakes that have the potential for coldwater fisheries.

Objectives

- ◆ Assess abundance and size distribution of Brown Trout and Alewives in TMLs (e.g. Crystal, East Twin, and Highland lakes), and other important coldwater lakes (e.g. Lake Wononskopomuc, and Saugatuck Reservoir) as time permits.
- ◆ Obtain temperature and oxygen profiles on Connecticut's coldwater lakes to monitor potential changes in summer coldwater habitat (the season with the most severe/restrictive habitat conditions for coldwater fisheries resources in CT).
- ◆ Investigate options for producing quality trout fisheries in coldwater lakes through stocking manipulation, special regulations, or forage enhancement, and the potential for managing other lentic coldwater fishes.
- ◆ Maintain and manage Kokanee Salmon fisheries in three of Connecticut's best coldwater lakes.
- ◆ Determine the need for continuing or changing special regulations on TMLs.

Approach

- ◆ TMLs and selected coldwater lakes (Figure 1.) are:
 - Stocked with special strains (Seeforellen) and sizes of Brown Trout during the spring and fall. Seeforellens are clipped (adipose fins removed) prior to stocking to aid in identification during sampling and angler survey efforts.
 - Sampled by standard boat electrofishing (pulsed DC) in October or early November to assess holdover trout and landlocked Alewife abundance (number sampled per hour of standardized electrofishing).
 - Sampled by trap nets in October or early-November to assess holdover trout. Brown Trout population size is estimated using the Schnabel mark-recapture method (Everhart et al. 1975); trout are captured, marked with unique fin clips, and recaptured using only trap nets.
 - Sampled with vertical gill nets during the summer to estimate relative abundance (number sampled per day with a standard gang of vertical gill nets) and age structure of Alewife.

- Sampled with YSI Pro-20 oxygen/temperature meters during mid- to late summer to obtain dissolved oxygen (DO) and temperature profiles.
- ◆ Enhance coldwater fishing opportunities in TMLs and important coldwater lakes by:
 - Restoring a viable Rainbow Smelt population in West Hill Pond. Fertilized smelt eggs are collected via spawning mats constructed out of PVC pipe that are wrapped with either Astroturf or Burlap fabric. Mats are placed along the shore and in tributaries of a drinking water supply reservoir that is closed to angling. Eggs that adhere to the artificial substrate are then transferred to the selected waterbody. Materials for the construction of spawning mats are donated by the Northwest Connecticut Sportsman's Council.
- ◆ Activities related to the assessment and management of Kokanee Salmon in three coldwater lakes (West Hill Pond, East Twin Lake, and Lake Wononskopomuc (Figure 1.) are completed by:
 - Collecting mature kokanee each fall (mid-October) for broodstock using trap nets at West Hill Pond and if necessary, at East Twin Lake.
 - Sampling with trap nets in October to assess Kokanee Salmon. Kokanee population size is estimated using the Schnabel mark-recapture method (Everhart et al. 1975); salmon are captured, marked with unique fin clips, and recaptured using only trap nets.
 - Spawning mature kokanee at Burlington State Fish Hatchery, where their progeny are raised to the fry stage.
 - Stocking 50,000 fry into West Hill Pond and 75,000-100,000 into East Twin Lake each spring, and any surplus fry into Lake Wononskopomuc.
- ◆ Roving angler surveys with a stratified random design (Malvestuto et al. 1978) are conducted as time permits in selected lakes (Study 2, Job 2) to determine angler effort, catch, harvest, and satisfaction.
- ◆ Summer fish kills in coldwater management lakes are investigated on an as needed basis.

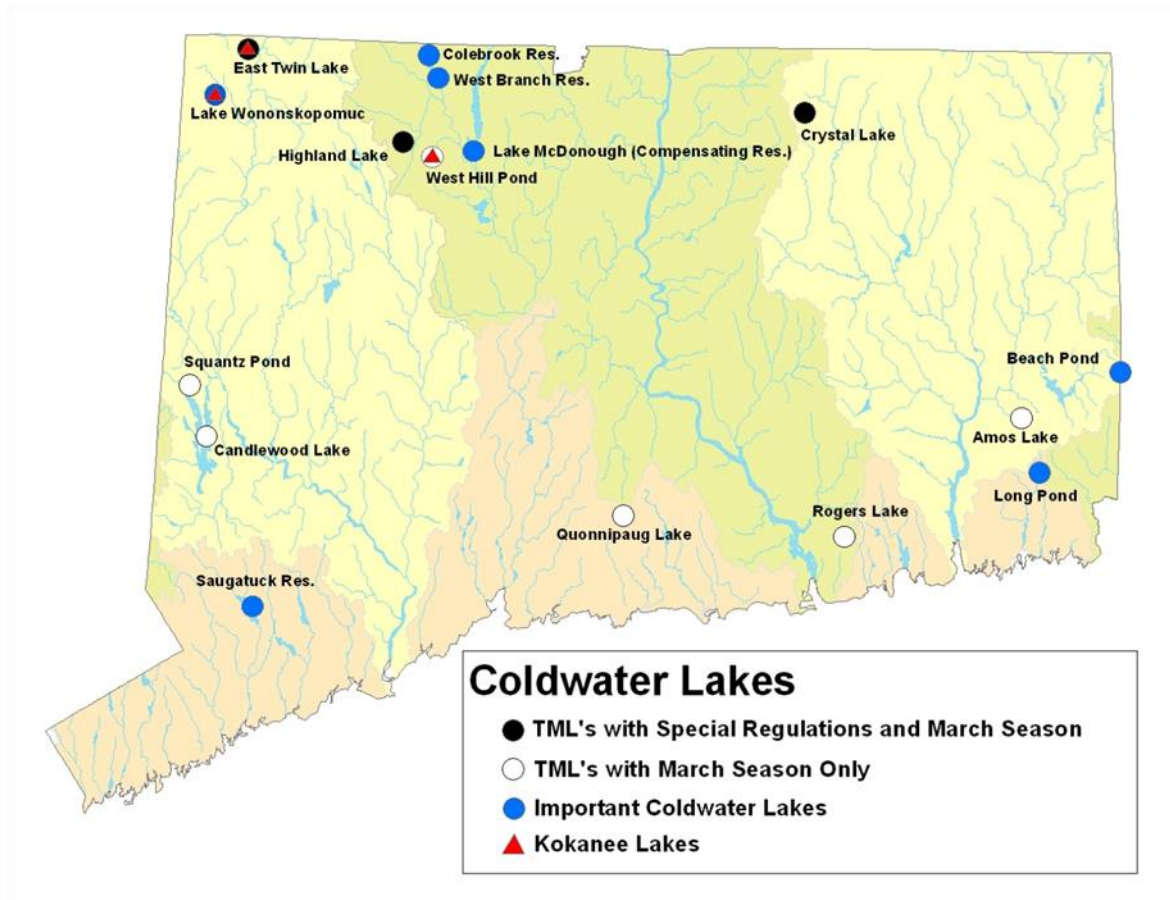


Figure 1. Location of TMLs, important coldwater lakes, and Kokanee Salmon lakes. Major watersheds are represented by color shading.

Key Findings

- ◆ Seeforellen-strain Brown Trout were stocked as yearlings (> 6 in.), large adults (> 12 in.), and broodstock (avg. weight of 15 lbs.) in 2014 (Table 1). In the fall of 2014, 500 adipose-clipped Seeforellen Brown and 500 pelvic-clipped (right side) Cortland-strain Brown Trout were stocked into West Hill Pond to compare catchability between the two strains.
- ◆ Highland Lake was not sampled by electrofishing during the fall of 2014 due to a deep water drawdown (~ 8 ft) from September through December. This was the first time since 2001 that fall Brown Trout and Alewife abundance sampling was not conducted.
- ◆ Crystal Lake was sampled by electrofishing during the fall of 2014.
 - At Crystal Lake, the relative abundance of Brown Trout sampled in October was low (5 fish/hr), and no holdovers (i.e. ≥ 16 inches) were observed (Table 2 and Appendix 1).

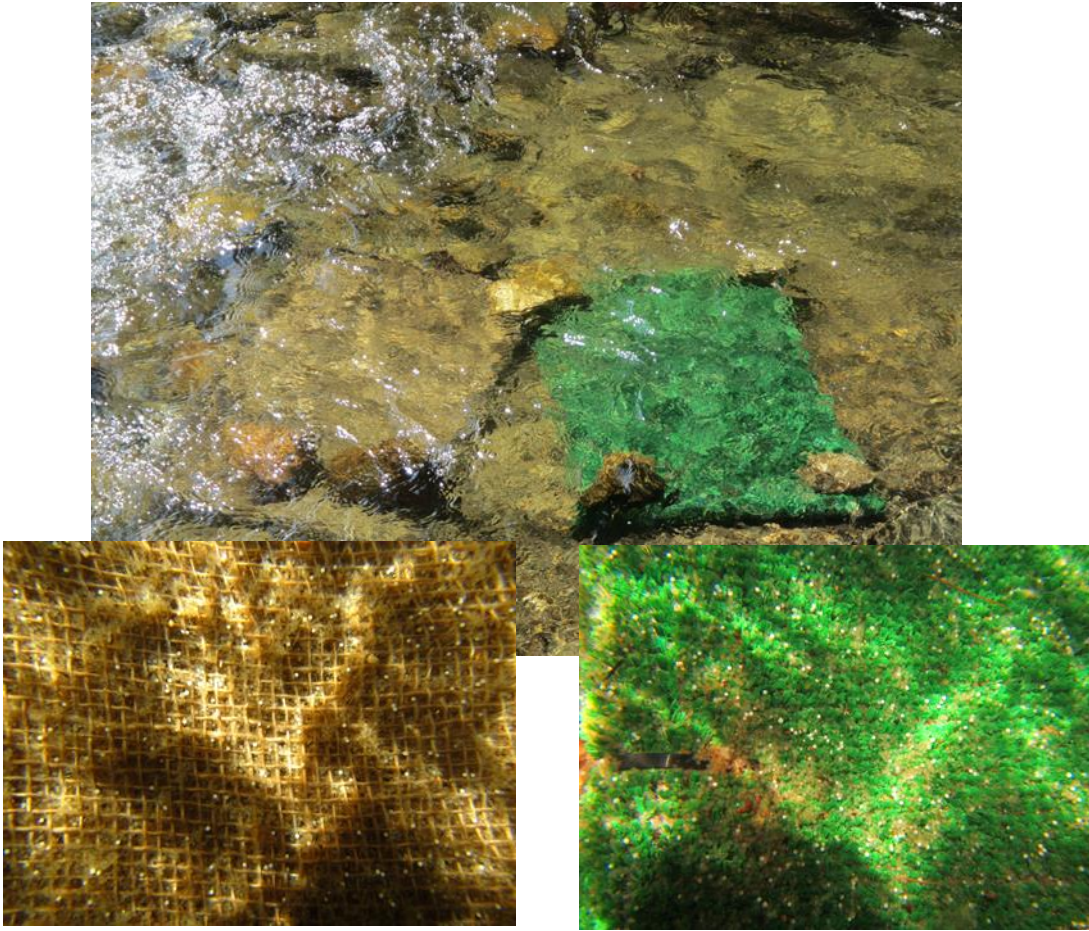
- Alewife abundance at Crystal Lake was 103 fish/hr; up from the two previous samples (21 fish/hr in 2012 and 40/hr in 2011) (Table 2).
- ◆ A Schnabel mark-recapture population estimate for Brown Trout was conducted using trap nets at East Twin Lake from 10/10/14 through 11/27/14.
 - Only recently stocked trout from the spring of 2014 were captured; no holdover Brown Trout (i.e. ≥ 16 inches) were observed; therefore, no population estimates are provided.
- ◆ Lake Wononskopomuc was sampled for Alewife using vertical gill nets (one overnight set with 5 nets) in August of 2014.



Landlocked Alewives collected from Lake Wononskopomuc in summer 2013

- Alewife abundance was lower at Lake Wononskopomuc (10/net-day; Table 2) than in 2013 (20/net-day).
- ◆ In the spring of 2014, 10 spawning mats were placed in a tributary and along the shore of a drinking water reservoir in northwest, CT to collect fertilized eggs from spawning Rainbow Smelt.
 - Thousands of eggs were collected on both types of spawning mat substrates; mats were then transferred to a tributary of West Hill Pond, and eggs were allowed to hatch.
 - Both live and dead Smelt were observed during the spawning migration.
 - Additional tributaries to the reservoir were investigated during the spawning run revealing numerous areas with future potential for egg collection.
- ◆ Water temperature and DO measurements taken July through August 2014 show:
 - The layer of optimum coldwater habitat ($\leq 19^{\circ}\text{C}$, with ≥ 4 mg/l of DO) was greatest and most persistent at Crystal Lake, East Twin Lake, Highland Lake, Lake Wononskopomuc, and West Hill Pond throughout the summer (Table 3).

- Suitable coldwater habitat for trout was depleted in Lake McDonough and Squantz Pond by mid-August.



Photos: (Top) Artificial spawning mats placed side-by-side in a tributary of a closed drinking water supply reservoir, (Bottom-left) a close-up view of Rainbow Smelt eggs on Burlap fabric spawning mat, (Bottom-right) close-up view of smelt eggs on AstroTurf spawning mat. Note that the white dots are actually dead eggs; viable eggs are light tan in color and are much more difficult to see.

- ◆ In the spring of 2014, Kokanee Salmon fry produced from the 2013 egg-take were stocked into East Twin Lake, West Hill Pond, and Lake Wononskopomuc (Table 4).
- ◆ In the fall of 2014, 600 mature Kokanee (avg. length nearly 18 and 17 inches for males and females, respectively) were captured in trap nets at West Hill Pond. Of those, 456 (228 pairs) were collected and spawned producing ~ 249,210 eyed eggs (83% eye-up) for the 2015 fry production cycle (Table 4). Fish not collected for spawning were returned to the lake.
- ◆ Kokanee abundance was 25 fish/net-day at West Hill Pond (Table 4).
 - Fewer adult Kokanee were netted at West Hill Pond in 2014 (600) than in 2013 (770 fish) and 2012 (1,480 fish).
- ◆ A Schnabel mark-recapture population estimate for Kokanee Salmon was conducted using trap nets at East Twin Lake from 10/7/13 through 10/27/14.
 - A total of 1,945 Kokanee were captured (47 fish/net-day; Table 4).
 - These fish averaged 14.5 inches (368 mm) in length for males and females combined. This average size is about 3 inches smaller than in 2011, when adult salmon averaged over 17 inches (432 mm). The smaller size may be indicative of density dependent competition because the number of Kokanee stocked during the three year period prior to 2011 (2008 [0], 2009 [51,400], and 2010 [51,000]) were lower than those stocked during the three year period prior to 2014 (2011 [52,000], 2012 [75,000], and 2013 [95,000]).
 - The population estimate for reproductively mature Kokanee Salmon was 4,767 fish, 95% CI 390 – 5,733 (The 95% Confidence Interval (CI) around the estimate is a measure of reliability. In this case we are 95% confident that the true population value lies between 390 and 5,733).



Male Kokanee Salmon netted from West Hill Pond.

- ◆ An angler survey was completed at West Hill Pond during the open water season (4/19/14-10/31/14) under the direction of Study 2, Job 2. See Table 5 for estimated total fishing hours and directed hours of angling effort.
 - For specific catch/harvest data of trout and Kokanee see Table 6.
 - Nearly 89% of all Kokanee and 50% of all trout landed by anglers are harvested for consumption at this location.
 - A high percentage of angling pressure at West Hill Pond is directed towards trout and salmon (66%).
 - Only 5 clipped Brown Trout were detected during the angler survey after stocking on 9/16/14. Of those, four were Cortlands (pelvic clip) and one was a Seeforellen (adipose clip); therefore, no inferences can be made regarding catchability between the two strains. The angler survey is on-going and additional catch events will be recorded.
- ◆ No fish kills were reported at any of the TMLs, or other important coldwater lakes in 2014.
- ◆ Based on the IFD Trophy Fish awards program, anglers reported catching 3 trophy salmonids from TMLs and important coldwater lakes in 2014.
 - At Squantz Pond, a 10 lb. 12 oz., 27.5 inch-long (699 mm) and a 7 lb. 0 oz., 28 inch-long (711 mm) Brown Trout.
 - At West Hill Pond, an 8 lb. 13 oz. 28.2 inch-long (716 mm) Brown Trout.

Table 1. Numbers, sizes, and lakes stocked with Seeforellen-strain Brown Trout in 2014.

Lake	Month of Stocking	Seeforellen-strain Brown Trout Stocked		
		> 6 inches	> 12 inches	> 16 inches
Beach Pond	September	0	500	0
Crystal Lake	October	0	1,000	0
East Twin Lake	December	0	0	50
Highland Lake	September/December	0	1,000	50
Lake Wononskopomuc	May	3,200	0	0
Long Pond	December	0	0	50
Saugatuck Reservoir	May	3,000	0	0
Squantz pond	December	0	0	50
West Hill Pond	September/December	0	500	50
Total		6,200	3,000	250

Table 2. Relative abundance of Brown Trout (number sampled per hour of standardized electrofishing) and Alewife (number sampled per day with a standard gang of vertical gill nets, and per hour standardized electrofishing) in 2014. Dashes indicate no sampling occurred. ¹Net-days (shown in parentheses) equal the number of nets set in the lake times the number of days (24 hr period) the nets fished.

Lake	Brown Trout			Alewife	
	No. per electro-hr			No. per electro-hr	No. per net-day (no. net-days) ¹
	<12 inches	12-16 inches	>16 inches	All sizes	All sizes
Crystal Lake	1	4	0	103	--
Highland Lake	--	--	--	--	--
East Twin Lake	--	--	--	--	--
Lake Wononskopomuc	--	--	--	--	10 (5)

Table 3. Layer of optimum cold, oxygenated Brown Trout water ($\leq 19^{\circ}\text{C}$, with DO levels ≥ 4 mg/l) for selected lakes sampled in the summer of 2014. Zeros indicate no optimum coldwater layer was detected.

Lake	Date	Layer of cold oxygenated water (m)	Upper limit of cold oxygenated water (m)	Lower limit of cold oxygenated water (m)
Crystal Lake	7/15/2014	5	5.5	10.5
Crystal Lake	8/29/2014	2	6.5	8.5
East Twin Lake	8/21/2014	5	6.5	11.5
Highland Lake	7/15/2014	5	5.5	10.5
Highland Lake	8/15/2014	3	5.5	8.5
L. Wononskopomuc	8/15/2014	6	5.5	11.5
Lake McDonough	7/15/2014	2	7.5	9.5
Lake McDonough	9/2/2014	0	--	--
Squantz Pond	8/29/2014	0	--	--
West Hill Pond	8/21/2014	3	7.5	10.5

Table 4. Numbers and locations of Kokanee fry stocked, numbers and relative abundance of Kokanee captured during trap netting efforts, and number of eggs taken for spawning in 2014. Dashes indicate no netting occurred

Lake	Number of Kokanee fry stocked	Number of Kokanee trap netted (broodstock) ¹	Number of Kokanee per net-day (no. net-days) ²	Number of eggs taken
East Twin Lake	92,000	1,975	47 (42)	0
West Hill Pond	52,000	600 (456)	25 (24)	249,210
L. Wononskopomuc	18,000	--	--	--

¹ Numbers in parentheses indicate the number of mature fish captured in trap nets that were taken as broodstock to Burlington Hatchery for spawning.

² Net-days (shown in parentheses) equal the number of nets set in the lake times the number of days nets were set.

Table 5. Estimated total angler effort (angler-hrs) at West Hill Pond during the 2014 **open water season**. The \pm 95% confidence limits (**CL**) around effort estimates are shown in parentheses. Estimated Directed effort (DE) (angler-hrs) for trout and Kokanee Salmon at West Hill Pond during the 2014 open water season. The percent of Total Effort is shown in parentheses. "Trout" directed effort includes only effort targeting trout species and does not include effort toward Kokanee Salmon.

Lake	Dates	Total Days	Total Angler Effort (CL)	Trout (DE)	Kokanee (DE)
West Hill P.	4/19/14 - 10/31/14	196	16,885 (16%)	7,363(44%)	3,795(22%)

Table 6. Estimated total catch and harvest (number of **All Trout, Brown Trout, Rainbow Trout, Brook Trout, and Kokanee Salmon**) at West Hill Pond during 2014 open water season. The \pm 95% confidence limits (**CL**) around catch and harvest estimates are shown in parentheses.

Crystal Lake	Dates	Open Water Days	Catch (CL)	Harvest (CL)
All Trout	4/19/14 - 10/31/14	196	8,066 (22%)	4,101 (29%)
Brown Trout	" "	" "	5,887 (20%)	2,914 (26%)
Rainbow Trout	" "	" "	1,750 (38%)	988 (53%)
Brook Trout	" "	" "	429 (71%)	199 (77%)
Kokanee Salmon	" "	" "	782 (67%)	694 (74%)

Discussion

Crystal Lake Sampling

Data from fall electrofishing at Crystal Lake demonstrates that in recent years IFD efforts (protective slot limit combined with carefully planned stockings) have not been successful at producing any number of large holdover Brown Trout. Even with the lake's sometimes abundant landlocked Alewife forage base, the lake no longer consistently produces holdover trout. This appears to be due to marginal to poor summertime coldwater habitat (excluding 2014) in many years, or poor recruitment/year-class strength for landlocked Alewife the predominate forage species.

Forage Sampling

The success of holdover Brown Trout in CT lakes largely depends on the ability of fish to survive and grow, which is primarily linked to the availability of forage and suitable coldwater habitat. In most CT lakes managed for trout, the primary forage is Alewife, whose populations are known to fluctuate considerably from year-to-year. Because Alewife numbers fluctuate, so can holdover trout numbers since predator populations often respond to available forage. Although

estimation of Alewife numbers can be difficult, landlocked Alewives were found in varying abundances in two of the coldwater lakes sampled (Crystal Lake and Lake Wononskopomuc). Alewife abundance was found to be lower at Lake Wononskopomuc in 2014 than in 2013, and considerably higher at Crystal Lake in 2014 than either 2012 or 2011; this is likely an artifact of the species' "boom and bust" life cycle. Finally, if adequate coldwater habitat is available throughout the summer, lakes identified as having Alewives present should produce some holdover brown trout, but to varying degrees dependent on the availability of Alewives as forage.

Forage Fish Enhancement in West Hill Pond

Historical records show that West Hill Pond frequently produced trophy-sized Brown Trout when Rainbow Smelt were present. As early as 1929, smelt spawned in a West Hill Pond tributary. From the 1970's through the early 1990's, a large water pump circulated lake water for a short distance upstream into the tributary to augment flows and improve access to spawning habitat by smelt. After pump operations ceased, Rainbow Smelt were extirpated due to diminished flows and the inability to gain access to suitable spawning habitat.

A donor population of Rainbow Smelt from a drinking water reservoir was identified in 2013, and utilized in 2014. Spawning mats placed strategically along the shore and in one tributary of the reservoir allowed for the collection of fertilized eggs, which were then transferred to a West Hill Pond tributary. Continued annual "seeding" will hopefully lead to a viable smelt population, which will likely improve the lake's ability to produce holdover Brown Trout and increase angling opportunities. However, a water pump may need to be operated during the spring season, in dry years, to ensure adequate stream flows and access to spawning habitat if the smelt become reestablished.

Kokanee Salmon Management/East Twin Lake Population Estimate

IFD fall trap netting efforts, as well as anecdotal angler reports show a robust population of Kokanee Salmon in West Hill Pond. This population is maintained through annual fry stockings, and presently there is no need to alter the stocking regime. After a 10+ year hiatus, and concurrent with the disappearance of the landlocked Alewife population, the recent population estimate conducted at East Twin Lake indicates that the lake once again has a thriving population of Kokanee Salmon. The lake's ability to produce Kokanee stems from good over-summer coldwater habitat, and an adequate forage base (zooplankton).

West Hill Pond Creel

The angler survey conducted at West Hill Pond shows that the vast majority of anglers target salmonids. In addition, harvest rates for Kokanee Salmon are considerably higher than those of

trout (89% vs. 50%). High harvest rates for Kokanee are likely because they are considered a culinary delight and ONE of the best tasting freshwater fish. In addition to its' exceptional flavor when consumed, Kokanee are also considered to be spectacular fighting fish, pound-for-pound and often display aerial acrobatics when hooked. This species continues to elicit a moderate but consistent following of avid anglers, which likely contributes to the continued levels of directed effort.

Recommendations

- ◆ Investigate management and stocking options/strategies based on the recent categorization of TMLs and important coldwater lakes.
 - Stocking of “large” sized Brown Trout (16 inch avg. length) worked well in Crystal Lake during the 2012 fishing season, and should be investigated for other lakes with limited or no holdover potential.
 - Determine hatchery production targets of “large” Brown Trout for stocking recommendations to manage certain coldwater lakes with suitable habitat but little or no holdover potential.
 - Investigate the relationships between trout stocking densities and catch rates in select lakes and determine if improvements are warranted.
 - Investigate the potential for producing a Survivor Strain best suited for Connecticut’s coldwater lakes similar to what has been done for the Farmington River (Hagstrom et al. 2011).
- ◆ Locate, map, and assess the inflow from thermal refuges in all TMLs and important coldwater lakes.
 - Data demonstrate that Highland Lake’s thermal refuges are critical for holdover production. Given possible long-term climactic changes and the potential for further declines in suitable coldwater lake habitat, the IFD should evaluate the pros/cons of enacting special regulations that reduce or restrict fishing in the lake’s refuges during the critical summer months.
- ◆ At Lake Wonoskopomuc the IFD should investigate the potential of more restrictive regulations to further improve holdover brown trout potential.
- ◆ Expand on restoration of Rainbow Smelt in West Hill Pond by expanding upon efforts of 2014.
- ◆ Connecticut is fortunate to have the only Kokanee Salmon populations east of the Rocky Mountains, and should strive to improve promotion of this unique fishing opportunity.

- ◆ Conduct ice season angler survey at West Hill Pond in the winter of 2014-2015, if time permits, to characterize Kokanee ice fishery and determine if there are differences in catchability between large, adult-size Seeforellen and Cortland-strain Brown Trout.



A male Kokanee Salmon from West Hill Pond during fall broodstock collection

Expenditures

Total Cost:	\$???,???
Federal Share:	\$???,???
State Share:	\$??,???

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Appendices

Appendix 1. Relative abundance (electrofishing catch per hour) for all sizes, below slot (< 12 in), slot size (≥ 12 in & < 16 in), and above slot (≥ 16in) Brown Trout from Crystal Lake during the fall, 1988-2014. All samples from 1988 – 2007 were conducted in November.

Year	All	< 12 in	≥ 12 in & < 16 in	≥ 16 in
1988	47	16	25	6
1989	28	12	14	2
1990	21	4	15	2
1991	12	1	8	2
1992	30	20	8	2
1993*	74	39	28	7
1994	41	20	13	8
1995	14	6	6	1
1996	41	16	20	5
1997	14	1	10	2
1998	31	3	22	6
1999	8	0	7	2
2000	0	0	0	0
2001	5	0	0	5
2002	0	0	0	0
2003	11	0	8	3
2004	17	5	10	2
2005	12	1	11	0
2006	13	0	13	0
2007	15	3	8	3
2008 ^a	86	1	84	1
2008 ^b	23	0	23	0
2009 ^a	382	67	308	8
2009 ^b	86	27	59	0
2010 ^a	61	14	41	7
2011 ^b	20	0	20	0
2012 ^a	0	0	0	0
2013	No Sampling Occurred			
2014 ^a	5	1	4	0

* denotes when special regulations were implemented

^a denotes sample was conducted in October

^b denotes sample was conducted in November